

The most commonly employed assay for mutagenic activity is done with various strains of *Salmonella typhimurium*. Whole smoke as well as CSC from four types of tobacco were found to be mutagenic in *S. typhimurium* TA1538 (Basrur et al. 1978). Sidestream smoke was also found to be mutagenic in a system where the smoke was tested directly on the bacterial plates (Ong et al. 1984). These studies lend support to the extensive assays performed with CSC that establish that tobacco smoke has significant mutagenic potential.

Several of the studies with CSC from mainstream smoke have been aimed at comparing the effects of various tobaccos, various tester strains, and various systems selected for metabolic activation. Most of the mutagenic activity was associated with the basic fraction of CSC (DeMarini 1983). For the CSC from mainstream smoke, mutagenic activity was primarily detected with the strains TA1538 and TA98, thus indicating the presence of the frame-shift type of mutagens. Except for studies on the effects of nitrate-treated cigarettes, metabolic activation was required to demonstrate mutagenic activity for most of the CSC studied.

Several short-term tests have been performed in eukaryotic systems. A solution of the gas phase of mainstream cigarette smoke dissolved in a phosphate buffer induced reciprocal mitotic recombination in *Saccharomyces cerevisiae* D3 and petite mutants in an isolate of strain D3 (Izard et al. 1980). Whole mainstream cigarette smoke induced mitotic gene conversion, reverse mutation, and reciprocal mitotic recombination in strain D7 of *S. cerevisiae* (Gairola 1982).

Transformation of mammalian cells was also induced in several cell systems using the CSC from mainstream cigarette smoke (Lasnitzki 1968; Inui and Takayama 1971; Rhim and Huebner 1973; Benedict et al. 1975; Takayama et al. 1978; Rivedal and Sanner 1980). Transplacental exposure to mainstream CSC was reported to transform Syrian hamster foetal cells (Rasmussen et al. 1981). Transforming activity was reported in the acidic and basic fractions as well as the neutral fractions of CSC. Studies on subfractions of CSC have shown that the basic fraction and some of the acidic fractions are the most active in cell transformation (Benedict et al. 1975). The neutral fraction of CSC was also reported to inhibit DNA repair in normal human lymphocytes (Gaudin et al. 1972). Transformation of mammalian cells with SS or ETS has not been reported.

Summary of Carcinogenicity

At present, the scientific literature offers some information on the physicochemical nature of the sidestream smoke from tobacco products and of environmental tobacco smoke. Chemical analytical studies have already demonstrated that SS and ETS contain a wide spectrum of carcinogens such as polynuclear aromatic hydrocarbons,

volatile and tobacco-specific N-nitrosamines, and polonium-210. To date, only one study has demonstrated the carcinogenic activity of the particulate matter of sidestream smoke and a few isolated reports have dealt with the genotoxicity of SS and ETS. Therefore, bioassay studies with the mainstream smoke and the environmental tobacco smoke of cigarettes are needed. Although the resulting bioassay data will derive from tests of concentrations of environmental smoke that do not realistically occur in the human setting, these results will provide information about the relative carcinogenic potential of sidestream smoke in comparison with the mainstream smoke of the same cigarettes. In a comprehensive analytical approach, data should be generated to systematically determine the concentrations of toxic and tumorigenic agents in the ETS samples and to simultaneously measure the uptake of tobacco-specific agents by the body fluids of nonsmokers exposed to ETS.

Conclusions

1. The main effects of the irritants present in ETS occur in the conjunctiva of the eyes and the mucous membranes of the nose, throat, and lower respiratory tract. These irritant effects are a frequent cause of complaints about poor air quality due to environmental tobacco smoke.
2. Active cigarette smoking is associated with prominent changes in the number, type, and function of respiratory epithelial and inflammatory cells; the potential for environmental tobacco smoke exposure to produce similar changes should be investigated.
3. Animal models have demonstrated the carcinogenicity of cigarette smoke, and the limited data that exist suggest that more carcinogenic activity per milligram of cigarette smoke concentrate may be contained in sidestream smoke than in mainstream cigarette smoke.

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CHAPTER 6

POLICIES RESTRICTING SMOKING IN PUBLIC PLACES AND THE WORKPLACE

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Introduction

Since the 1970s, the accumulating evidence on the health risks of involuntary smoking has been accompanied by a wave of social action regulating tobacco smoking in public places. Initiatives in the public sector and in the private sector have aimed at protecting individuals from exposure to sidestream smoke by regulating the circumstances in which smoking is permitted. Smoking in public places has been regulated primarily by government action at the local level and at the Federal level. Legislation has been the most common vehicle at the local and State level; agency regulations have predominated in the Federal Government. There has been relatively little judicial action to restrict smoking in public places; most cases have focused on nonsmoking employees' right to a smoke-free workplace (Feldman et al. 1978; Eriksen, in press; Walsh and Gordon 1986). Private sector initiatives have gained momentum in the 1980s. Businesses in a wide variety of industries have adopted smoking policies to protect employee health. Other private initiatives include no-smoking sections in restaurants, no-smoking rooms in hotels and motels, and smoking restrictions in hospitals.

Though this trend was fueled by growing evidence about the health effects of involuntary smoking, it also reflects the changing public attitudes about smoking since 1964, when public attention was focused on the health hazards of cigarette smoking by the Report of the Advisory Committee to the Surgeon General (US PHS 1964). The acceptability and desirability of tobacco smoking in public places has fallen dramatically over time, as reflected in public opinion surveys. A majority now support the right of nonsmokers to breathe smoke-free air and favor policies that ensure that right (ALA 1985b; Hanauer et al. 1986; BNA 1986; US DHEW 1969).

This chapter addresses the scope and impact of these diverse policies. It begins with a review of the current status of policies restricting smoking. Issues specific to smoking regulation in transportation vehicles and motels, restaurants, stores, schools, health care facilities, and the workplace are addressed. The effects of smoking policies on air quality, attitudes, and smoking behavior are considered.

Current Status of Restrictions on Smoking in Public Places

Smoking regulations in public places represent a mix of public and private actions. A public place may be defined as any enclosed area in which the public is permitted or to which the public is invited. Smoking restrictions are generally limited to indoor enclosed spaces (Hanauer et al. 1986). This broad definition of a public place encompasses a diverse group of facilities that differ in the degree to which smoking is restricted, the ease of introducing new regulations,

and the methods by which new smoking restrictions have been proposed and adopted.

Smoking in Federal, State, and local government facilities has been addressed by legislative and regulatory action. These facilities include government offices, public schools and libraries, and publicly owned transportation, health care, cultural, and sports facilities. In public facilities under private ownership, smoking restrictions are a mixture of government-sponsored regulation and private initiative. These facilities include retail stores, restaurants and bars, hotels and motels, and privately owned transportation, health care, cultural, and sports facilities.

The extent and acceptability of smoking restrictions in public places is influenced by (1) whether ownership is public or private; (2) the historical acceptance of smoking in the facility; (3) the degree to which nonsmokers are exposed to involuntary smoking, determined by the facility's size, degree of ventilation, and ease of separating smokers and nonsmokers; and (4) the degree of inconvenience that smoking restrictions pose to smokers. Smoking restrictions are still most widespread and least controversial in facilities where smoking has traditionally been prohibited by fire codes, such as theaters or libraries, or where smoking is negatively associated with the activity taking place, such as gyms or health care facilities (Feldman et al. 1978). Small crowded areas with poor ventilation, such as elevators and public transit vehicles, are also frequently regulated. On the other hand, the strong association of smoking with eating and drinking contributes to the controversial nature of smoking restrictions in restaurants and bars.

Legislative Approaches

Federal Legislation

Congress has enacted no Federal legislation restricting smoking in public places, although bills have been introduced in Congress several times since 1973 (Feldman et al. 1978).

State Legislation

Most legislation restricting smoking has been enacted at the State level. Although legislation regulating smoking for health reasons is largely a phenomenon of the past decade, cigarette smoking has been the subject of restrictive legislation for nearly a century. Early legislation had two different rationales. The first, a relatively noncontroversial rationale, was the protection of the public from fire or other safety hazards, largely in the workplace (Warner 1981b).

The second, more controversial motivation for early legislative action was a moral crusade against cigarettes similar in tone and coincident with the moral crusade against alcohol that emerged at

the turn of the century (Dillow 1981; Sobel 1978). Its goal was a total ban on cigarettes, which were blamed for social evils and physical ills, based largely on unfounded claims. By 1887, three States (North Dakota, Iowa, and Tennessee) had completely banned the sale and use of cigarettes. At the peak of the movement, cigarettes were banned in a dozen States (Nuehring and Markle 1974; Sobel 1978). Most were in the Midwest where cigarette consumption was low and anticigarette feeling high. The movement lost momentum when enforcing the regulations proved controversial. As part of the strong reaction to alcohol prohibition, all State laws banning smoking were repealed by 1927.

During the 1960s, as the health risks of smoking became widely recognized, public policy on smoking began to focus on encouraging the smoker to quit. However, the few existing State laws regulating smoking in public places were old and limited in scope. Even newly enacted laws—in Delaware (1960) and in Michigan (1967, 1968)—restricted smoking in limited areas: public buses and trolleys, elevators, and retail food establishments (US DHHS 1985b). Protecting the health or comfort of nonsmokers was not cited as a rationale of these laws. As of 1970, statutes restricting smoking were in force in 14 States (US DHHS 1985b).

In the early 1970s, a new wave of smoking legislation emerged. It covered smoking in a larger number of places and extended for the first time to privately owned facilities. The language became more restrictive, moving from permitting a no-smoking section to requiring one and making nonsmoking the principal or assumed condition. The language also changed to make it clear that the specific intent was the safety and comfort of nonsmokers.

The pace of new legislation increased in the mid-1970s. Between 1970 and 1974, 9 laws were enacted in 8 States; between 1975 and 1979, 29 new laws were passed and 15 additional States adopted smoking regulations. Minnesota passed its landmark Clean Indoor Air Act in 1975 "to protect the public health, comfort, and environment by prohibiting smoking in public places and at public meetings except in designated smoking areas" (Minnesota Statutes Annual 1985). It covered restaurants, private worksites, and a large number of public places, and soon became the model for other State legislation. Within the next 5 years, Utah, Montana, and Nebraska enacted similar comprehensive legislation (US DHHS 1985b). The language of statutes passed by 11 States during the 1970s made it clear that the specific purpose was to protect nonsmokers from involuntary smoking (US DHHS 1985b). Model legislation and advice about the successful enactment of State laws can be found in several sources (Hanauer et al. 1986; Feldman et al. 1978; Walsh and Gordon 1986).

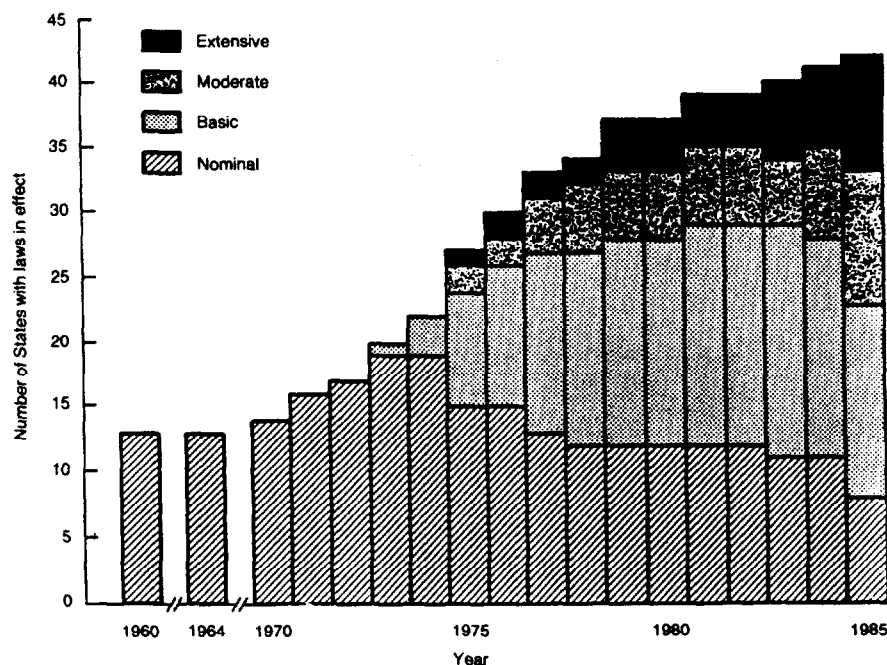


FIGURE 1.—Prevalence and restrictiveness of State laws regulating smoking in public places, 1960–1985

NOTE: See appendix for definitions of restrictiveness of laws.

SOURCE: ASH (1986); OTA (1986); Tri-Agency Tobacco Free Project (1986); US DHHS (1985b).

The rate of enactment of State legislation increased throughout the seventies (Figure 1, Table 1). The pace of new legislation continues in the 1980s, with 23 new laws enacted by 16 States between 1980 and 1985 (Table 1). As of 1986, 41 States and the District of Columbia have enacted laws regulating smoking in at least one public place (Figure 1). Eighty percent of the U.S. population currently resides in States with some smoking restriction, compared with 8 percent in 1971 (Warner 1981b). Most of the nine States with no smoking legislation are concentrated in the southeast United States and include three of the six major tobacco-producing States (North Carolina, Virginia, and Tennessee) (Figure 2).

Current State legislation varies in comprehensiveness and language. The number of public places in which smoking is regulated by State law ranges from 1 (Delaware, Mississippi, and South Carolina regulate smoking on public transportation only) to 16 (Minnesota and Florida) (US DHHS 1985b, Tri-Agency Tobacco Free Project

TABLE 1.—State laws restricting smoking, 1970–1985

Year	Number of newly enacted laws	Cumulative number of States with laws in effect	Restrictiveness of newly enacted laws ¹	Average restrictiveness of laws in effect
1892–1969	—	14	—	.250
1970	0	14	—	.250
1971	2	16	.250	.250
1972	1	17	.250	.250
1973	3	20	.330	.263
1974	3	22	.417	.296
1975	12	27	.479	.388
1976	5	30	.563	.425
1977	6	33	.542	.462
1978	2	34	.625	.478
1979	4	37	.688	.507
1980	1	37	— ²	.507
1981	6	39	.500	.513
1982	1	39	— ²	.513
1983	4	40	.688	.538
1984	3	41	.667	.549
1985	8	42	.719	.619

¹ Index of Restrictiveness

0 = None; no statewide restrictions.

0.25 = Nominal; State regulates smoking in one to three public places, excluding restaurants and private worksites.

0.50 = Basic; State regulates smoking in four or more public places, excluding restaurants and private worksites.

0.75 = Moderate; State regulates smoking in restaurants but not private worksites.

1.00 = Extensive; State regulates smoking in private worksites.

² New California laws in 1980 and 1982 extended smoking restrictions to additional public places, but did not alter the restrictiveness of the State law (moderate).

1986). State laws most often restrict smoking in public transportation (35 States), hospitals (33 States), elevators (31 States), indoor cultural or recreational facilities (29 States), schools (27 States), public meeting rooms (21 States), and libraries (19 States) (Table 2). Other public places specifically mentioned in State smoking legislation are public restrooms and waiting rooms, jury rooms, polling places, prisons, hallways, stairwells, and stables. Most laws restrict smoking in these places to designated areas, thereby making nonsmoking the norm; in a few States smoking is banned entirely in these places. For example, smoking on public transportation is banned entirely in four States (Florida, Georgia, Massachusetts, and Washington) and one (Washington) bans smoking in theaters, museums, auditoriums, and indoor sports arenas. Smoking restric-

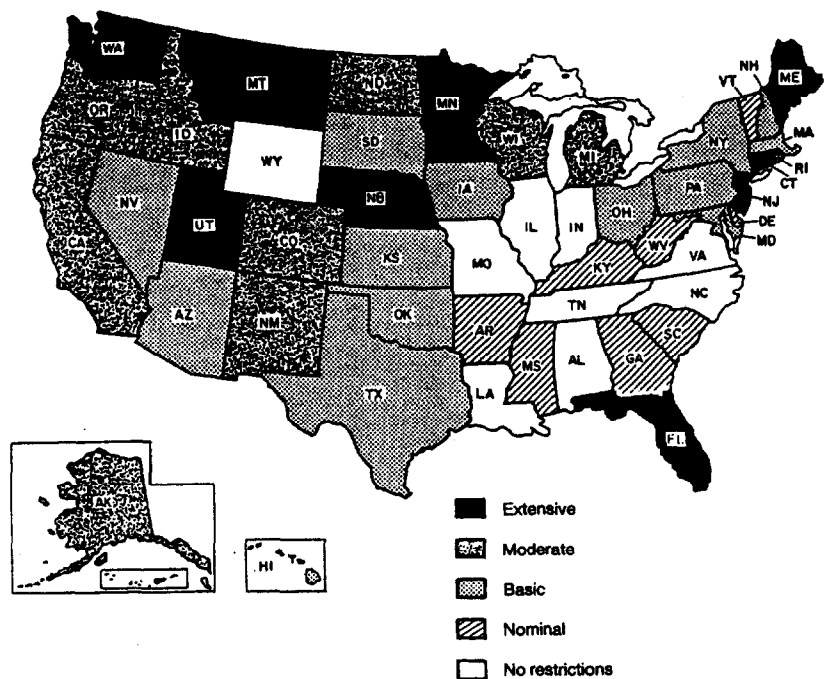


FIGURE 2.—Geographic variability of State laws regulating smoking in public places, 1986

NOTE: See appendix for definitions of restrictiveness of laws.

SOURCE: ASH (1986); OTA (1986); Tri-Agency Tobacco Free Project (1986); US DHHS (1985b).

tions extend to restaurants and retail stores, which are largely privately owned, in 18 States.

Smoking at the workplace is restricted for public sector employees in 22 States and for private sector employees in 9 States. The provisions of worksite smoking legislation vary widely, making direct comparisons of their comprehensiveness difficult.

Currently enacted workplace smoking laws contain provisions to (1) require a written policy (5 States); (2) limit smoking to designated areas (8 States); (3) require the posting of signs (10 States); and (4) give preference to nonsmokers in resolving conflicts over the designation of a work area (2 States) (OTA 1986). Public or private worksites are included in the definition of public places in some States where worksites are subject to the general provisions for public places. Other States have written separate guidelines for the worksite, which are usually more stringent. Laws in four States apply only to State and local government employees; restrictions apply to the private worksite in an additional nine States.

State	AL	AK	AZ	AR	CA	CO	CT	DE	DC	FL	GA	HI	ID	IL	IN	IA	KS	KY
					1971,76		1973						1925					
Year(s) legislation enacted	—	1975 1984	1973 1981	1977 1985	1980,81 1982	1977 1985 ¹	1974 1983	1960	1979	1983 1985	1975	1976	1975 1985	—		1978	1975	1972
PUBLIC PLACES WHERE SMOKING IS PROHIBITED (EXCEPT IN DESIGNATED AREAS)																		
Public transportation		X	X	(X) ²	X ^{3,4}	X	X ⁵	X	X	X ^{3,5}	X ⁵		X			X	X	X
Elevators		X ⁵	X			X	X ⁵		X	X ⁵	X ⁵	X	X			X	X	
Indoor recreational or cultural facilities ⁶		X	X		X	X				X		X	X			X	X	
Retail stores		(X) ⁷			(X) ⁷	X	X		X	X			X					
Restaurants		X ⁸			X ⁸	X	X ¹⁰			X ⁸			X					
Schools		X	X	X	X	X	X		X	X			X					X
Health care facilities																		
Hospitals		X	X	X	X	X	X		X	X		X	X			X	X	
Nursing homes		X			X	X	X		X	X			X			X	X	
Public meeting rooms		X			X		X		X	X		X	X			X	X	
Libraries		X	X							X						X	X	
Restrooms		X ⁵	X			X	X			X								
Waiting rooms		X	X			X	X			X						X		
Other		X ^{26,27}	X ²⁷							X ^{26,27,30}								
WORKSITE SMOKING RESTRICTIONS ¹⁸																		
Public worksites		D ¹⁷			B	D ¹	B		B	B,D ¹⁸		B ¹	B			D		
Private worksites		A					B			B,D								
IMPLEMENTATION PROVISIONS																		
Nonsmokers prevail in disputes		X																
No discrimination against nonsmokers																		
ENFORCEMENT																		
Penalties for violations		X	X	X	X		X	X	X	X	X	X	X			X	X	X
Smoking		X ^{23d}	X ^{23p}	X ^{23e}	X ^{23e}		X ^{23c}	X ^{23c}	X ^{23e}	X ²³ⁱ	X ^{23e}	X ^{23e}	X ^{23d}			X ^{23e}	Z ^{23c}	X ^{23e}
Failure to post signs		X ^{24h}								X ^{24h}								
Overall State law restrictiveness: ²⁵	0	3	2	1	3	3	4	1	2	4	1	2	3	0	0	2	2	1

TABLE 2.—Continued[illegible]

State	OK	OR	PA	IL	SC	SD	TN	TX	UT	VT	VA	WA	WV	WI	WY	
Year(s) legislation enacted	1975	1973, 1977	1927 1947	1976 1977	1937	1974	—	1975	1976 1979	1892	—	1983	1913 1919 1985	1984	—	
																Total N (%) 51 (100)
PUBLIC PLACES WHERE SMOKING IS PROHIBITED (EXCEPT IN DESIGNATED AREAS)																
Public transportation	X			X	(X) ²	X		X	X			X ⁵	X	X		35 (68.6)
Elevators	X	X		X		X		X	X			X ⁵		X		31 (60.8)
Indoor recreational or cultural facilities ⁶	X	X	X	X		X		X	X			X ⁵		X		29 (59.6)
Retail stores		X	X	X					X			X ⁵		X		18 (35.3)
Restaurants		X		X					X			X		X		18 (35.3)
Schools		X		X		X		X	X			X ⁵	X	X		27 (52.9)
Health care facilities																
Hospitals		X	X	X		X		X	X			X		X		33 (64.7)
Nursing homes		X	X	X				X	X			X		X		29 (56.9)
Public meeting rooms		X							X			X ⁵				21 (41.2)
Libraries	X			X		X		X	X			X				19 (37.2)
Restrooms												X				11 (21.6)
Waiting rooms		X										X		X		16 (31.4)
Other			X ³⁰	X ²⁸								X ¹⁵				12 (23.5)
WORKSITE SMOKING RESTRICTIONS ¹⁶																
Public worksites		D							D ¹⁷			D		D ¹⁸		22 (43.1)
Private worksites									D ^{17,22}	A ²²		D	A ²²			9 (17.6)
IMPLEMENTATION PROVISIONS																
Nonsmokers prevail in disputes									X							4 (7.8)
No discrimination against nonsmokers									X							2 (3.9)
ENFORCEMENT																
Penalties for violations	X	X	X	X		X		X	X	X		X	X	X		40 (78.4)
Smoking	X ^{23e}	X ^{23b}	X ^{23c}	X ^{23e}		X ^{23p}		X ^{23o}	X ^{23o}	X ^{23a}		X ^{23f}	X ^{23a}	X ^{23c}		39 (76.5)
Failure to post signs		X ^{24e}		X ^{24e}									X ^{24e}			9 (17.6)
Overall State law restrictiveness: ²⁵	2	3	2	3	1	2	0	2	4	1	0	4	1	3	0	

TABLE 2.—Continued (Footnotes)

-
- ¹ Executive order.
- ² School buses only.
- ³ Including school buses.
- ⁴ California stipulates that at least 50 percent of all passenger seats must be in nonsmoking areas on trains, airplanes, and street railroad cars departing from the State.
- ⁵ Smoking never permitted in this area.
- ⁶ Indoor recreational and cultural facilities: museums, auditoriums, theaters, and sports arenas.
- ⁷ Grocery stores only.
- ⁸ Restaurants seating 50 or more persons must have a no-smoking section.
- ⁹ Restaurants seating 50 or more persons must have a no-smoking section if the restaurant is in a publicly owned building.
- ¹⁰ Restaurants seating 75 or more persons must have a no-smoking section.
- ¹¹ Restaurants must designate at least 30 percent of their seats as a no-smoking area.
- ¹² Restaurants are encouraged to establish no-smoking areas.
- ¹³ Restaurants must designate at least 50 percent of their seats as a no-smoking area.
- ¹⁴ (Deleted).
- ¹⁵ No place other than a bar may be designated a smoking area in its entirety.
- ¹⁶ Worksite (only B, C, and D count as having a worksite policy in calculation of totals): A – Employer must post a sign prohibiting smoking at the worksite; B – Employer must have a (written) smoking policy; C – Employer must have policy that provides a nonsmoking area; D – No smoking except in designated areas.
- ¹⁷ Employer must post signs designating smoking and no-smoking areas.
- ¹⁸ Employer must post signs in smoking areas.
- ¹⁹ Employer must post either smoking or no-smoking signs, depending upon their policy.
- ²⁰ Employer must post signs in no-smoking areas.
- ²¹ State does not restrict smoking in factories, warehouses, and similar places of work not usually frequented by the general public.
- ²² Prohibits smoking in any mill or factory in which a no-smoking sign is posted.
- ²³ Persons who smoke in a prohibited area are subject to a fine or a penalty. Maximum fines or penalties, where applicable, are listed below: a = \$5; b = \$10; c = \$25; d = \$50; e = \$100; f = \$100/day; g = \$200; h = \$300; i = \$500; j = \$50 or up to 10 days in jail or both; k = \$50 or 90 days imprisonment; l = civil action; m = minor misdemeanor; n = petty misdemeanor; o = misdemeanor; p = petty offense.
- ²⁴ Persons who are required to and fail to post smoking and/or no-smoking signs are subjected to a penalty. Maximum fines, where applicable, are listed in footnote 23.
- ²⁵ Restrictiveness key: 0 = None, no statewide restrictions; 1 = Nominal, State regulates smoking in one to three public places, excluding restaurants and private worksites; 2 = Basic, State regulates smoking in four or more public places, excluding restaurants and private worksites; 3 = Moderate, State regulates smoking in restaurants but not private worksites; 4 = Extensive, State regulates smoking in private worksites.
- ²⁶ Jury rooms.
- ²⁷ Halls and stairs.
- ²⁸ Stables.
- ²⁹ Polling places.
- ³⁰ Prisons, at prison officials' discretion.

The least restrictive workplace laws simply empower the employer to restrict smoking in factories by posting signs. These statutes were enacted in the early 1900s. The weakest recent laws simply require an employer to issue a written smoking policy and to post signs. More restrictive laws require that employers designate no-smoking areas at work, implying that smoking is the norm. The most comprehensive laws prohibit smoking except in designated areas, making nonsmoking the norm. Seven States (Florida, Maine, Minnesota, Montana, Nebraska, Utah, and Washington) have this type of law. In several States, some worksites or some parts of a worksite (usually private offices) are exempted from the regulations. To prevent employers from complying with the letter but not the intent of the law, some States prohibit a workplace from being designated as entirely smoking.

State laws vary in their provisions for implementation and enforcement. In most States, the State health department is responsible for policy enforcement. Nearly all (39 of 42) States with laws provide penalties for smokers who violate restrictions; the maximum penalty is \$500. In two States violators can be jailed. Employers or others who fail to designate smoking areas can be fined in nine States.

The comprehensiveness of State laws, as defined by the number and nature of places where smoking is restricted or prohibited, has increased since 1970. In 1981, Warner (1981b) classified State laws according to their comprehensiveness (restrictiveness) and documented an increase in the average restrictiveness from 1971 to 1978. An updated and modified index of the comprehensiveness of State laws (described in the appendix) demonstrates that the phenomenon reported by Warner has continued into the mid-eighties. The comprehensiveness of newly enacted laws increased markedly during the mid-seventies, and the average restrictiveness of State laws in effect has increased more than twofold between 1972 and 1985 (Table 1, Figure 3). As shown in Figure 1 and Table 1, the increase in comprehensiveness of State laws occurred in two ways. The average comprehensiveness of first laws in additional States increased, and existing State smoking laws were replaced with more comprehensive legislation.

Warner also documented that both the prevalence and comprehensiveness of State laws enacted through 1978 varied by geographic region (Warner 1982). This has not changed (Table 3, Figure 2). Over 90 percent of the States in the Northeast and West have enacted at least one law regulating smoking, as have three-fourths of the North Central States. Southern States have fewer laws than other regions, and the laws they have are less comprehensive than laws in other regions. The six major tobacco-producing States, all located in the South, have less restrictive laws than do the other six Southern